(54) Title: INTELLIGENT INPUT/OUTPUT CONTROL SYSTEM

(57) Abstract

An intelligent Input/Output Control Board ("IOCB") (100) translates signals from gaming peripheral devices for transmission to a standard microcomputer board ("MCB") (32) for real–time local control of the player interface, eliminating the need to develop custom real–time control routines for game software (54) for gaming machines (10), such as a slot machine (20). The MCB (32) is the main game processor, and provides an industry standard platform for the game software (54) and advanced multi–media and networking functions. The IOCB (100) acts as a peripheral to the MCB (32), converting specific player interbase actions into generic control codes for the MCB (32), and translates signals from the MCB (32), into specific game codes recognised by peripheral devices attached to the IOCB (100). The MCB (32) and IOCB (100) combination significantly reduce the game software's complexity and development cos, while adding advanced multi–P media/networking functions and retaining real–time control. The IOCB (100) comprises a microprocessor (102), memory (106) and storage means (108), a plurality of control means (172) for controlling the various peripheral devices, and several communications links, one to communicate with the MCB microprocessor (34), others to communicate with the peripheral devices, and a secondary communications link (250) which allows expansion of the IOCB (100). Additional game player peripherals can be connected to the IOCB (100), using the secondary communications link (250) enabling further expansion of the gaming machine (10) without necessitating additional custom software development. The IOCB (100) controls the gaming deck buttons (15) and lights (16), accepts and verifies monetary transactions, and verifies game security, including the door switches (194), accounting control mechanisms and metering devices (196).

INTELLIGENT INPUT/OUTPUT CONTROL SYSTEM
FIELD OF THE INVENTION

This invention relates to gaming apparatus of the type commonly known as slot machines or video poker machines. The machines incorporate a microprocessor based electronic system for play of a game of chance or skill (game dependent). All game play is initiated in response to a player's action. The game play and its progression is viewed on either a mechanical display (such as reels, dice, or wheels), an electronic display such as a cathode ray tube ("CRT"), plasma display, electro-luminescent (EL) panel, a liquid crystal display screen ("LCD"), or other types of display devices or combination of display devices.

BACKGROUND OF THE INVENTION

Current video and slot machine gaming technology is based upon embedded microprocessor technology in which both the game software and hardware are proprietary to the specific gaming manufacturer. This custom hardware platform is produced with a fixed set of peripherals specific to the individual game design. The game software is then written to match the specific hardware configurations. All of the interface software is hard-coded into the microprocessor board, the interface software being customised for the specific peripherals being used. While this design methodology is most efficient in terms of cost and manufacturability, it has proven too rigid and limiting in the face of the industry's growing requirements for multi-media presentation, networking capabilities, and other advanced features.

In an effort to expand their games' capabilities, some gaming manufacturers have explored the alternative of using high end microcomputer multi-media and networking peripherals in their standard game designs. Unfortunately, this design approach has several drawbacks:

1) the high-end peripherals have very short product life cycles;

2) little if any stock software is available for the resulting custom hardware platform; and

3) designs using high-end peripherals often require specialised design systems and techniques not normally within the capabilities of gaming manufacturers.

The resulting designs are thus significantly more expensive to design initially, are subject to repeated redesign as component availability changes,

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and are significantly more complex to support as each hardware revision requires custom software for its' specific peripheral set.

The new approach described herein is an alternative design that alleviates all of the problems associated with the use of high-end multi-media and network peripherals in a gaming device.

The main difference in this new approach is to employ an off-the-shelf industry standard Micro Computer Board ("MCB"), rather than design a custom processor board. The MCB provides an existing proven design having all the needed multi-media and networking capability in a standard package with standardised electrical and software interfaces. Because there are numerous manufacturers producing equivalent MCBs, multiple sources of MCBs are available for use in production. Finally, the standardised software interface allows the use of an industry standard operating system ("OS") with a complete multi-media management system and network protocol, eliminating the need to recreate the operating system and network protocol in the game software.

A second difference in this new approach is to employ a custom Input/Output Control Board ("IOCB") for the real-time game play interface. The IOCB is based on a microprocessor with a memory means which is programmed to handle the specific game play interface, providing a generic software interface to the MCB. This generic software interface removes the need for configuration specific control routines in the game software. This generic software interface isolates the game software from any changes in the game player interface hardware. The resulting combination of MCB and IOCB provides a game design with built-in high-end multi-media and network capability that can operate on several different MCB's without modification of the game software, yet still maintain specific control of the game player interface in real-time.

The main feature of the MCB which allows hardware independence is the Standard Operating System interface software drivers. The interface software drivers translate generic sound, video and network control codes into specific controls for communicating with the hardware platform. As new peripheral devices become available and are introduced into the MCB market, hardware specific interface software drivers are also introduced. The new interface software drivers are written to integrate seamlessly into the operating system and have the same look and feel as the old interface

software drivers. Loading the new interface software drivers into the system allows new hardware to operate identically to the previous hardware, granting complete forward compatibility to older revision software.

In a manner much the same as the interface software drivers, the IOCB also provides isolation between the game software and the specific game play interface. The IOCB acts as a control buffer for the external game play interface; the IOCB translates the generic codes of the game software into the specific codes of the individual interfaces for the various peripheral devices. In this way, specific control codes for an interface and the associated communications protocols required for communicating to the interface can be generalised in the game software with the translation and specific protocols/control codes encoded directly into the IOCB firmware. In addition, an expansion communications bus (the secondary communications bus) is built into the IOCB allowing new game play interfaces to be added in the future as new game player interfaces become available. When these new interfaces are connected to the IOCB, the firmware in the IOCB identifies the new interface and passes its configuration to the appropriate interface software driver on the MCB. Once identified, the interface software driver on the MCB locates and loads the additional interface software required to handle the new interface, with the IOCB acting as a message handler between the MCB and the new interface. The process of identifying and load of new game interface related interface software drivers is discussed in greater detail in Nugame's Dynamic hardware linking patent application.

A second advantage to using the IOCB is the alleviation of the problems associated with real time control of peripherals under a multi-tasking operating system. As more of the functions needed to operate the game are turned over to the OS and Graphical User Interface ("GUI"), less control is retained over the timing of software executions. The resulting timing uncertainty creates a significant problem in the real-time control of the game play interfaces. The use of the IOCB alleviates this problem because the IOCB operates in parallel with the game software; the IOCB monitors and controls the game play interface in real-time while the game software is left to handle other functions related to multi-media, networking and game play. When conditions affecting game play are detected by the IOCB, it translates the information into a generic protocol and transmits the information to the MCB.

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SUMMARY OF THE INVENTION

The present invention is a gaming apparatus based on an industry standard MCB that utilises a novel Input/Output Control Board ("IOCB) for real-time control and monitoring of standard game play interfaces. The game software operates on the MCB using an industry standard operating system ("OS") with a graphical user interface ("GUI") enabling the game control software to be independent of changes in game peripheral device hardware and to have expanded multimedia and network capabilities.

An intelligent Input/Output Control Board ("IOCB") controls, monitors and translates signals to and from gaming peripheral devices for communication with a standard microcomputer board ("MCB") for the purpose of real-time local control of the player interface, eliminating the need for custom real-time control routines in the game software. The MCB contains the main game processor, and provides an industry standard platform for the game software and advanced multimedia and networking functions. The IOCB converts specific player interface actions into generic control codes for interfacing to the MCB, and translates signals from the MCB into specific game codes recognised by peripheral devices attached to the IOCB. The MCB and IOCB combination significantly reduce the game software's complexity and development cost, while adding advanced multi-media/networking functions and retaining real-time control. The IOCB comprises a microprocessor, memory and storage means, a plurality of control means for controlling the various peripheral devices, and several communications links, one to communicate with the MCB microprocessor, others to communicate with the peripheral devices, and a secondary communications link which allows expansion of the IOCB. Up to three IOCBs can be connected to the same MCB, enabling further expansion of the gaming machine without necessitating additional custom development. The IOCB can, but is not limited to, control/monitor, the gaming deck buttons and lights, accept and verify monetary transactions and verify game security, including door switch, accounting controls and metering devices.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood by the detailed description of the preferred embodiment, with reference to the drawings, in which:

Figure 1 illustrates two standard gaming devices (ye, Video Poker and Reel Slot) in which the present invention can be applied;

Figure 2 illustrates the organisation of the microcomputer board; and the game, operating system, and graphical user interface software functions;

Figure 3 illustrates the interaction between the Input Output Control Board of the present invention and the main game processor functions;

Figure 4 illustrates the organisation of the Input Output Control Board of the present invention and game peripheral functions; and

Figure 5 illustrates the expansion of a gaming system using multiple Input Output Control Boards of the present invention and game peripheral devices.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention is an intelligent input/output control board ("IOCB", or "control board") which is designed to work as the basis of a gaming machine, such as the video poker machine 10 or slot machine 20 shown in Fig. 1. As will be described below. each of these machines contains a microcomputer board 30 (not shown in Fig. 1) which contains the instructions for operating the games (ye., the game software). As shown in Fig. 1, elements common to these machines include a display 11, a coin slot 12, a bill or card (credit card, debit card, other forms of electronic media) acceptor slot 13, a coin hopper/receptacle 14, a plurality of game buttons 15 which may contain lights 16 therein. Each gaming machine offers several ways in which the game player can deposit moneys into the machine, receive change where appropriate, in order to place bets on the conclusion of the particular game or games. In the case of slot machine 20, a handle 21 is present which can be used to operate the machine. The game buttons, lights and handles offer a means of allowing the player to interact with the gaming device, with the possibility of affecting the game conclusion. Mechanical and electrical components of these machines known to those skilled in the art are not illustrated. Included among the known functions of these gaming machines are the ability of the game to generate a random conclusion, and to offer a variable return play based upon a particular game conclusion and the game conclusions of other gaming devices with which a particular gaming device may be networked. Also, these gaming devices have the ability to vary the payout, such as paying a progressive jackpot which provides an additional return payout based upon the history of the various game conclusions prior to a particular playing of the game, whether on a specific gaming machine or from one or more gaming machines networked to the

specific gaming machine being played. These gaming devices also generate a variety of audio and visual effects, both during game play and between game play.

For the purposes of this specification, the term "gaming machine" or "gaming device" will be reference numeral 10, and will refer to either of the machines shown in Fig. 1, or similar machines.

The Main Game Processor and Software Systems

The main game processor 30 system (Fig. 2) described in the present invention is predicated on using an industry standard MCB 32 with a standard OS 50 combined with a GUI 52 (Fig. 2). The MCB 32 has a central processing unit (or microprocessor) 34, memory means 36 including volatile storage means 38 and non-volatile storage means 40, secured memory storage means 42 and nonsecured memory storage means 44. As shown schematically in Fig. 2, the operating system 50 and GUI 52 and the game software 54 are all in communications with each other and operate on the MCB 32 as interrelated programs. This standardised hardware architecture and OS approach is used for three unique reasons: 1) The platform can utilise the built-in multi-media and networking functions of the OS 50 and GUI 52; 2) The electrical interface 46 to the system is an industry standard for which systems and peripheral devices are readily available, and; 3) It utilises an interface software system 70 for control of its on-board peripheral devices.

The combination of an OS 50 and GUI 52 provide the game developer with a platform that is supported by both industry standard development software and off-the-shelf standard function software for advanced graphics, sound generation, multi-tasking and networking (shown schematically in Fig. 3). The availability of off-the-shelf feature software plus the wealth of development software available significantly reduce the work required to effect integration of new multi-media and network features. The OS 50 and GUI 52 also provide a common software interface (i.e., interface software) to the system hardware 71 (shown schematically as video hardware 72, sound hardware 74 and network hardware 76 in Fig. 2) which allows the software to migrate from MCB to MCB, without modification to the OS 50, GUI 52 or game software 54. Video hardware 72 includes the display devices described previously in this application, but not meant to be limited to them, such as CRTs, LCDs, etc., that are known to those skilled in the art. Sound hardware 74 includes, but is not meant to be limited to, a variety of speakers,

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transducers, sound systems and affiliated electrical components as known to those skilled in the art. Similarly, network hardware 76 includes, and is not meant to be limited to, various microprocessors, storage devices memory means acting as communications devices, 605 modems, wired
5   communications lines such as telephone networks, both public or private, wireless communications systems, as well as such networking hardware known to those skilled in the art.

The interface software system 70 is specifically designed to isolate the game software 54, OS 50, and GUI software 52 from variations in the
10   hardware platform, such as may occur when using peripheral devices having different interface requirements because they are produced by different manufacturers. Interface software 70 acts as a translator between the complex communication systems of the OS/GUI combination and the bit by bit control functions of the MCB peripherals. Additionally, the design of the
15   interface software 70 allows the ability to "plug and play" new peripherals that may not have been available at the time game software 54, OS 50 and GUI 52 software were written. The flexibility and fault tolerance of this interface software system 70 allow the game software 54, OS 50 and GUI 52 to migrate seamlessly from hardware platform to hardware platform, without
20   requiring the actual redesign and re-certification that is normally associated with hardware changes.

The industry standard electrical interface 46 to the system further isolates the game and its' software from variations in the main game controller electronics 30 (see Fig. 2). Using a standard electrical interface 46
25   allows the gaming manufacturer to design the IOCB 100 to a common electrical interface, without having to account for variation in the design of the MCB 32. The standard electrical interface 46 also allows the gaming manufacturer to specify multiple MCB manufacturers for game production, without requiring numerous electrical interfaces that would be specific to
30   individual MCB manufacturers.

The I/O Control Board

The preferred embodiment of the Input Output Control System described in this patent is based on using an IOCB in a gaming device 10 as a means for controlling generic game peripheral devices 171 without the
35   necessity of custom programming the gaming machine 10 to accommodate any specific game peripheral device.

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The IOCB system 100 uses an embedded microprocessor 102 to act as an intelligent game play interface for the MCB 32. IOCB microprocessor 102 is in communication with the MCB 32 of the gaming machine 10 using a communications interface 104. IOCB microprocessor 102 has memory means 106, which includes storage means 108, means for volatile memory storage 110 and means for non-volatile memory storage 112, such as, but not meant to be limited to, firmware or EPROM (Electronically Programmable Read Only Memory) memory. Memory means 106 further includes secured memory means 114. As shown in Fig. 3 game play interface functions managed by the IOCB include a plurality of game buttons 117, a plurality of lamps 118, and a plurality of both high and low resolution feature displays 120 (not shown); coin acceptors and validators 174, bill acceptors and validators 180, bill and coupon dispensers 182 (not shown), card acceptance, card validation and dispensing 186, and coupon acceptance 188; as well as means for control and message routing for the secondary communications bus 250. Each of these peripheral devices are connected to the IOCB at ports 210. Ports 210 can be either serial ports, parallel ports, game ports, or other device interface ports known to those skilled in the art, and are not shown for purposes of clarity,

The IOCB 100 monitors the status of all input functions buffering and translating their state into a standard control code which is then transmitted to the MCB 32 for processing by the game software 54. The IOCB 100 also accepts output control codes for driving a plurality of game play interfaces 140, 170 and 190, and translating the control codes into the specific format required for the interface and handling all drive and communications protocols required by the game player interfaces. Finally, new game play interfaces 300 (Fig. 5), not specifically configured for in the IOCB board 100, are handled by the secondary communications bus 250. The secondary communications bus 250 handles all communications needed for future game play interface expansion, arbitrating the communications and dynamically configuring the new interfaces for operation with the I/O control board interface software. In conclusion, IOCB system 100 provides a generic translation and control interface between the MCB 32 and the game play interfaces. The IOCB 100 further unloads and receives all configuration and real-time game play interface control functions from the MCB 32, leaving the

main game MCB 32 free to manage game play, networking and multi-media display functions.

A complete specification for the communications protocols used between the MCB 32 and the IOCB 100 is discussed in detail in the NuGame patent application for an I/O Interface and device abstraction (US Serial No. 60/094068, filed 24 July 1998). Similarly, the secondary communications system and bus 250 described in our patent application for a Secured inter processor virtual device communications (US Serial No. 60/086632, filed 23 May 1998) and Method of linking devices to gaming machines (Serial No. 60/089785, filed 18 June 1998).

The following description is therefore limited to the specific standard peripheral set normally handled by the IOCB 100 directly, and a brief description of the secondary communications bus 250.

The first set of game play interfaces under direct control of IOCB 100 are the player deck interfaces 140 (Fig. 4). The player deck interfaces include deck buttons 117 used in game play, associated deck button lamps 118, and all low resolution displays 120 used for indicating game play status. Player deck interface includes control means 142 in electrical communication with these individual components, and in communication with microprocessor 102 and memory means 106. Player deck interface control means 142 receives and monitors all deck button switch contacts and translates the key press information into specific game key press codes for transmission to MCB 32 by communications linkage 104. Player deck interface control means 142 includes means for driving deck button lamps 118 and displays 120. Player deck interface control means 142 has translation means to translate command codes received from MCB 32 into specific messages and lamp controls, and further includes means to provide all refresh and update functions required for proper display operation.

Money handling interfaces 170 is the second set of interfaces under direct control of IOCB 100 (Figs. 3 & 4). Money handling interfaces 170 include a control means 172 which controls peripheral devices involved in the acceptance/validation of coins, bills and coupons, vending of coins, bills and coupons, and acceptance of currency/credit via electronic media (i.e., credit/debit cards) (Fig. 4). Money handling control means 172 is in communication with these peripherals, and in communication with microprocessor 102 and memory means 106.

Coin, bill and coupon acceptance/validation is accomplished via dedicated currency validators 174 which accept and verify the authenticity of the currency. Money handling control means 172 and microprocessor 102 are in communication with and monitor the validator's 174 operations, money handling control means 172 providing all control and interface functions required by the currency validator 174 for proper acceptance and validation. Money handling control means 172 in conjunction with IOCB microprocessor 102 formats and translates the currency information for transmission to MCB 32 via communications link 104. It should be noted that certain coupons may require additional validation by the main game processor 32, in which instance money handling control means 172 and IOCB microprocessor 102 transmit the coupon information received from the coupon validator 174 to the MCB 32 for verification. Once verification codes are received back from the MCB 32 by microprocessor 102 and money handling control means 172, the coupons are accepted.

Coin, bill and coupon dispensing is handled by separate vending peripherals such as, coin hoppers 178, and bill/coupon dispensers 184. IOCB 100 controls the operation of the coin hoppers 178 and bill/coupon dispensers 184 directly or through interface electronics embedded in the bill/coupon dispensers. Coin hopper control means and bill/coupon dispenser control means are controlled by money handling control means 172 in communication with microprocessor 102. The IOCB 100 initiates and controls all vending of money in response to command codes from the MCB 32 and money handling control means 172 in turn returns confirming vend codes to the coin hoppers 178 or bill/coupon dispensers 184. Electronic media 186 such as credit cards, debit cards, smart cards, or other media known to those in the art, is handled by custom readers 188 which accept and read the identification information from the specific media. These readers 188 transmit this data to the money handling control means 172 which, in conjunction with microprocessor 102, monitors the output from the readers 188, provides any control signals required for acceptance, formats the information, and transmits it to the MCB 32 by communications link 104 for final validation and game credit.

Game security is also monitored and controlled by the present invention. The game security interfaces 190 include game security means 192 which monitors and/or controls peripheral devices such as game door

switches 194, electro-mechanical or electronic accounting meters 196, configuration/accounting key switches 198. and the MCB's secured memory storage 114. Game door switches 194 are monitored by game security control means 192, in conjunction with and in communication with IOCB 100's non-

5   volatile monitoring system 116, which detects a door open condition, and can do so even during a power down situation. Upon power up, game security control means 192 receives signals from the door switches 194 and reads the condition of the doors (i.e., whether they are open or closed). Game security control means 192 reports any and all game accesses (indicated by a door

10   open condition) to the MCB 32 for error handling and system notification.

The electro-mechanical or electronic meters 196 are incremented by game security control means 192 in response to commands from MCB 32. These meters are known to those skilled in the art, and as examples and not meant to be a limitation, generally function to indicate the total money

15   deposited, paid to the customer, and number of games played. In the event of a power interruption prior to completion of the meter's increment function, IOCB 100 stores the remaining balance of the meter count(s) in secure memory storage 114. Upon return of system power, secure memory storage 114 transmits the meter increment function to the meter 196 and the

20   meter increment function is completed. Game security control means 192 is in communication with and the status of the configuration/accounting key switches 198 and upon a status change of these key switches, game security control means 192 reports the new state to MCB 32.

IOCB 100 also contains the secure non-volatile data storage means 201

25   for the main game processor 52. Secure storage means 201 can only be accessed following an unlocking procedure issued by the MCB 32. Secure storage means 201 includes a lock out means 199 which is under control of MCB 32. Access to secure storage means 201 is timed to prevent corruption of the secure storage in case a failure occurs before the main game processor

30   can reset the safety lock out 199. IOCB 100 has power monitoring means 200 in communication with microprocessor 102, such that IOCB 100 can determine an imminent power failure and prevent access to the secure storage means 201.

Secondary communications bus 250 is in communication with

35   microprocessor 102 and controlled by IOCB 100. Secondary communications bus controller means 252 allows expansion of the IOCB 100 beyond the

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standard set of interfaces by allowing the connection of additional IOCBs 100 which in turn may be connected to additional peripheral devices, such as shown in Fig. 5. In this capacity, first IOCB 100 acts as a router for commands from the game program, forwarding commands and data using its secondary communications bus 250 to the expansion peripherals 300, verifying the presence and integrity of all message traffic on the secondary communications bus 250. In this manner, additional gaming peripherals can be added without the necessity of custom programming or other modifications of the game software.

An in-depth explanation of the interdependent operational features of the secondary communication bus is presented in NuGame's patent application for a Secured inter-processor/virtual device communications system (Serial No.60/086632, filed 23 May 1998).

The present invention thus provides a generic interface to the microcomputer board of a gaming machine. The present invention removes the need for configuration specific control routines in gaming software and also isolates the game software from any changes in hardware. The resulting combination of MCB and IOCB provides a game design with built-in high-end multi-media and network capability that can operate on several different MCB's without modification of the game software, yet still maintaining specific control of the gameplayer interface in real-time. The present invention allows the ability to "plug and play" new peripherals that may not have been available at the time game software, or the operating system of graphical user interface software were written.

The present invention acts as a control buffer for the external game play interface; the IOCB translates the generic codes of the game software into the specific codes of the individual interfaces for the various peripheral devices. In this way, specific control codes for an interface and the associated communications protocols required for communicating to the interface can be generalised in the game software with the translation and specific protocols/control codes encoded directly into the IOCB firmware. The expansion communications bus (the secondary communications bus) of the present inventions allows new game play interfaces to be added in the future as new game player interfaces become available. When these new interfaces are connected to the IOCB, the present invention identifies the new interface and passes its configuration to the appropriate interface

software on the MCB. Once identified, the interface software on the MCB locates and loads the additional interface software required to handle the new interface, with the present invention acting as a message handler between the MCB and the new interface.

5   Finally, it should be pointed out that while a number of other patent applications have been referred to, they are not "essential subject matter" for the invention sought to be protected in this application; that is, the disclosure herein is complete.

           It will be appreciated by persons skilled in the art that numerous
10   variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

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CLAIMS:

1.   A control circuit for connecting a peripheral device to a system of playing games of skill or chance, the control circuit comprising:

        a microprocessor memory means having storage means, the memory means in communication with the microprocessor;

        a plurality of control means, the control means being in communication with the microprocessor; and

        a first means for communicating, the first means for communicating in communication with the microprocessor, the control circuit being able to receive signals from gaming peripheral devices, the microprocessor in conjunction with the memory and storage means translating the signals to first gaming codes, the first means for communicating transmitting the first gaming codes to the gaming machine, and to receive second gaming codes from the gaming machine, the second gaming codes being transmitted to the microprocessor, the microprocessor translating the second gaming codes to second gaming signals and transmitting the second gaming signals to the peripheral device, the microprocessor translating the gaming codes and gaming signals in real time.

2.   The control circuit as claimed in claim 1, wherein the plurality of control means is connected to and in communication with a peripheral device.

3.   The control circuit as claimed in claim 1 or 2, wherein the plurality of control means includes a game play control means.

4.   The control circuit as claimed in claim 3, wherein the game play control means further include means for controlling deck buttons.

5.   The control circuit as claimed in claim 3 or 4, wherein the game play control means further include means for controlling a lamp.

6.   The control circuit as claimed in claim 3, 4 or 5, wherein the game play control means further include means for controlling a display.

7.   The control circuit as claimed in any one of the preceding claims, wherein the plurality of control means further includes a means for controlling money handling.

8.   The control circuit as claimed in claim 7, wherein the means for controlling money handling includes means for controlling a currency validator.

9.   The control circuit as claimed in claim 7, wherein the means for controlling money handling includes means for controlling a coin acceptor.

10.   The control circuit as claimed in claim 8 or 9, wherein the means for controlling money handling includes means for controlling a coin hopper.

11.   The control circuit as claimed in claim 7, 8, 9 or 10, wherein the means for controlling money handling includes means for controlling a bill acceptor and validator.

12.   The control circuit as claimed in claim 7, 8, 9, 10 or 11, wherein the means for money controlling includes means for controlling an electronic media acceptor.

13.   The control circuit as claimed in any one of claims 7 to 12, wherein the means for money controlling includes means for accepting and validating coupons.

14.   The control circuit as claimed in any one of the preceding claims, wherein the plurality of control means further includes a means for controlling game security.

15.   The control circuit as claimed in claim 14, wherein the means for controlling game security includes a means of monitoring door switches.

16.   The control circuit as claimed in claim 14 or 15, wherein the means for controlling game security includes a means of controlling accounting meters.

17.   The control circuit as claimed in any one of the preceding claims, wherein the memory means further includes secure storage means.

18.   The control circuit as claimed in any one of the preceding claims, wherein the plurality of control means further includes means for determining electrical power status of the gaming device.

19.   The control circuit as claimed in claim 18, wherein the means for determining electrical power status includes means to determine if a power failure is imminent.

20.   The control circuit as claimed in claim 19, wherein the power determining means controls operation of the secure storage means.

21.   The control circuit as claimed in any one of the preceding claims, further comprising a secondary means for communicating, the secondary means for communicating in communication with the microprocessor, the secondary means for communicating being a means for connecting additional peripheral devices to the control circuit.

22.   The control circuit as claimed in claim 21, wherein the secondary means for communicating is connected to a second plurality of peripheral devices, the control circuit acting as a means for routing signals from the gaming machine to the second plurality of peripheral devices.

23.   A system for playing games of skill or chance using one or more of a plurality of gaming machines, the system comprising;

        means for accepting and dispensing moneys in the form of coin, bills, coupons and electronic media for betting on the game conclusion;

        means for generating a game with a random conclusion;

        means for player interaction with the game with the possibility of affecting the game to conclusion including a means for displaying the game play and the conclusion;

        means for generating audio and visual effects during and between the game play;

        means for returning a variable payout based upon the conclusion of the gaming machine and the conclusion of one or more of a plurality of additional gaming machines;

        means for returning a variable payout based upon the history of the conclusion of the gaming machine and the conclusion of one or more of a plurality of additional gaming machines prior to play by the player; and

        a central processing unit, the central processing unit having memory means and a means for communicating, the central processing unit in communication with the money accepting and dispensing means, the means for generating the conclusion, the means for player interaction, the means for generating the audio and visual effects, and the means for returning the variable payout;

        the central processing unit further being in communication with a control circuit for connecting a peripheral device to the gaming machine, the control circuit comprising:

        a microprocessor;

        a memory means having storage means, the memory means in communication with the control circuit microprocessor;

        a plurality of control means, one of the control means in communication with a peripheral device, the control means in communication with the control circuit microprocessor; and

a first means for communicating, the first means for communicating in communication with the control circuit microprocessor and the central processing unit, the control circuit receiving signals from the peripheral device, the control circuit microprocessor in conjunction with the memory

5   and storage means translating the signals to first gaming codes, the first means for communicating transmitting the first gaming codes to the central processing unit, the central processing unit transmitting second gaming codes using the first means of communicating to the control circuit microprocessor, the control circuit microprocessor transmitting the second

10   gaming codes to the peripheral device, the control circuit microprocessor translating both sets of gaming codes and gaming signals in real time.

24.   The system for playing games of skill or chance as claimed in claim 23, wherein each of the plurality of control means is connected to and in communication with a peripheral device.

15   25.   The system for playing games of skill or chance as claimed in claim 23 or 24, wherein the plurality of control means includes a game play control means.

26.   The system for playing games of skill or chance as claimed in claim 25 wherein the game play control means further include means for controlling a

20   deck button.

27.   The system for playing games of skill or chance as claimed in claim 25 or 26, wherein the game play control means further include means for controlling a lamp.

28.   The system for playing games of skill or chance as claimed in claim 25,

25   26 or 27, wherein the game play control means further include means for controlling a display.

29.   The system for playing games of skill or chance as claimed in any one of claims 23 to 28, wherein plurality of control means further includes a means for controlling money handling.

30   30.   The system for playing games of skill or chance as claimed in claim 29, wherein the means for controlling money handling includes means for controlling a currency validator.

31.   The system for playing games of skill or chance as claimed in claim 29 or 30, wherein the means for controlling money handling includes means for

35   controlling a coin acceptor.

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32. The system for playing games of skill or chance as claimed in claim 29, 30 or 31, wherein the means for controlling money handling includes means for controlling a coin hopper.

33. The system for playing games of skill or chance as claimed in claim 29, 30, 31 or 32, wherein the means for controlling money handling includes means for controlling a bill acceptor and validator.

34. The system for playing games of skill or chance as claimed in any one of claims 29 to 33, wherein the means for controlling money handling includes means for controlling an electronic media acceptor.

35. The system for playing games of skill or chance as claimed in any one of claims 29 to 34, wherein the means for controlling money handling includes means for accepting and validating coupons.

36. The system for playing games of skill or chance as claimed in any one of claims 29 to 34, wherein the plurality of control means further includes a means for controlling game security.

37. The system for playing games of skill or chance as claimed in claim 37, wherein the means for monitoring game security includes a means of controlling door switches.

38. The system for playing games of skill or chance as claimed in claim 36 or 37, wherein the means for monitoring game security includes a means of controlling accounting meters.

39. The system for playing games of skill or chance as claimed in any one of claims 24 to 38, wherein the memory means further includes secure storage means.

40. The system for playing games of skill or chance as claimed in any one of claims 24 to 39, wherein the plurality of control means further includes means for determining electrical power status of the gaming device.
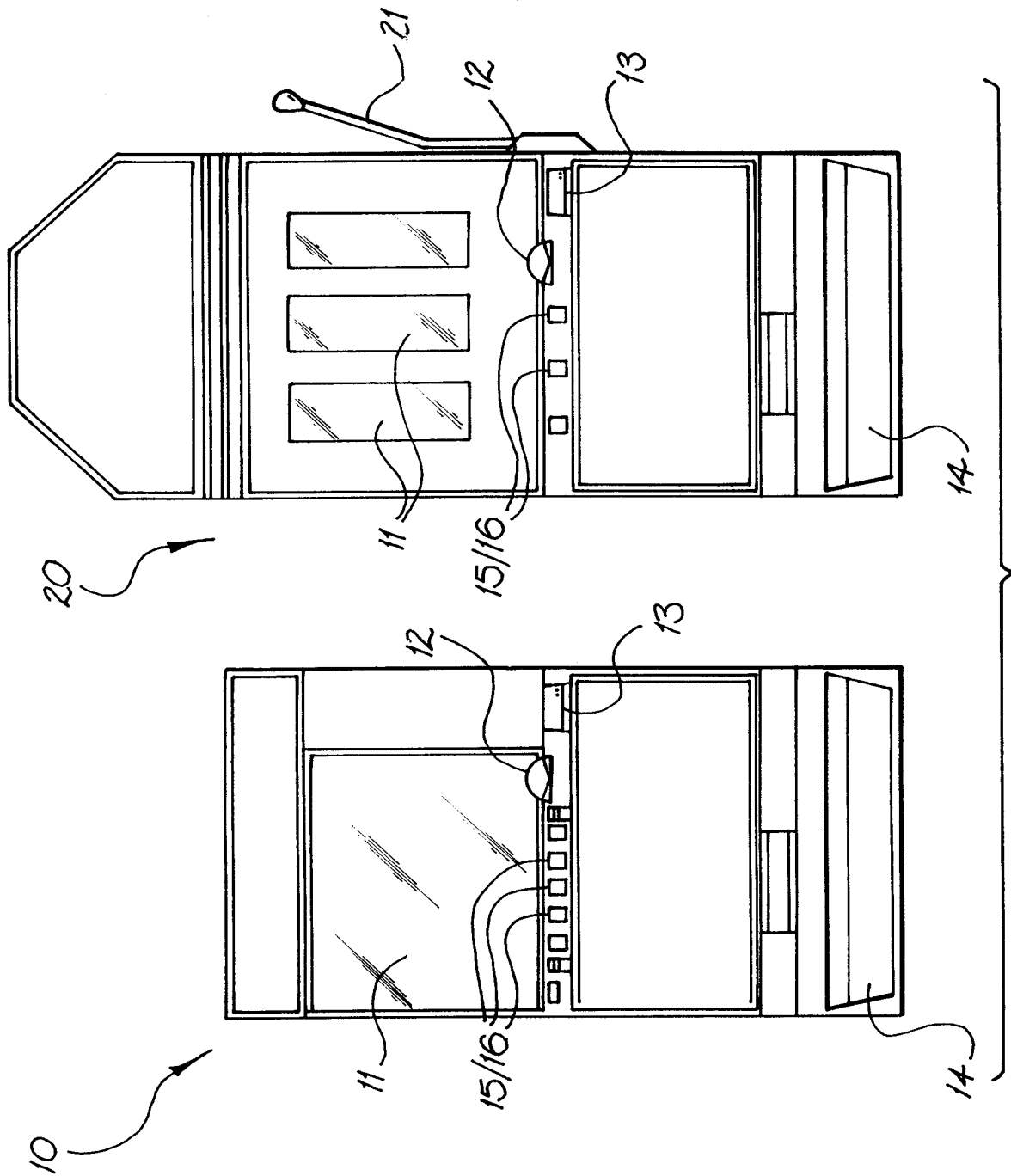
41. The system for playing games of skill or chance as claimed in claim 40, wherein the means for determining electrical power status includes means to determine if a power failure is imminent.

42. The system for playing games of skill or chance as claimed in claim 41, wherein the power determining means controls operation of the secure storage means.

43. The system for playing games of skill or chance as claimed in any one of claims 24 to 42, further comprising a secondary means for communicating, the secondary means for communicating in communication with the

microprocessor, the secondary means for communicating being a means for connecting additional peripheral devices to the control circuit.

44.   The system for playing games of skill or chance, as claimed in claim 42, wherein the secondary means for communicating is connected to a plurality of control means with the control circuit acting as a means for routing signals from the gaming machine to the second plurality of peripheral devices.
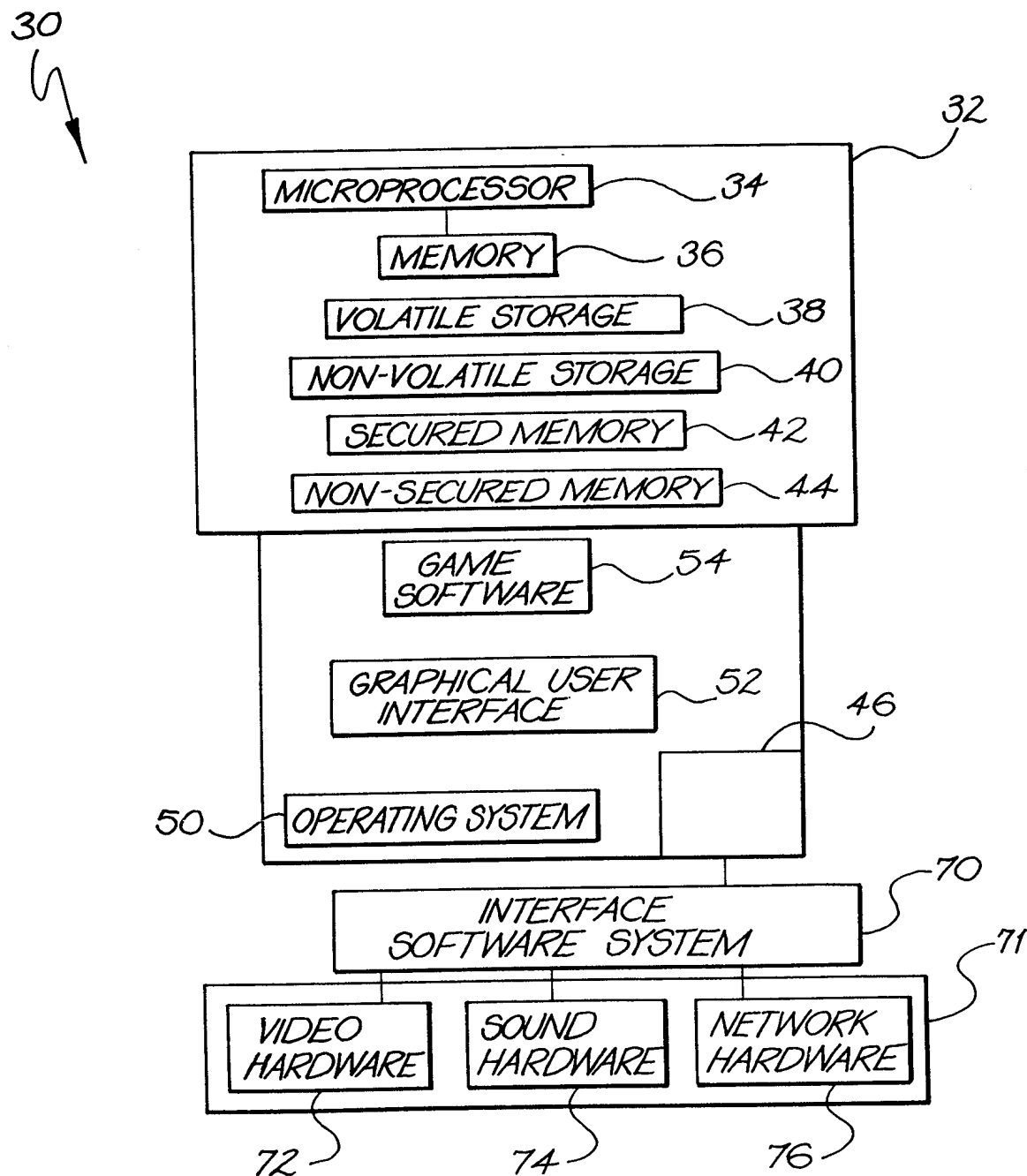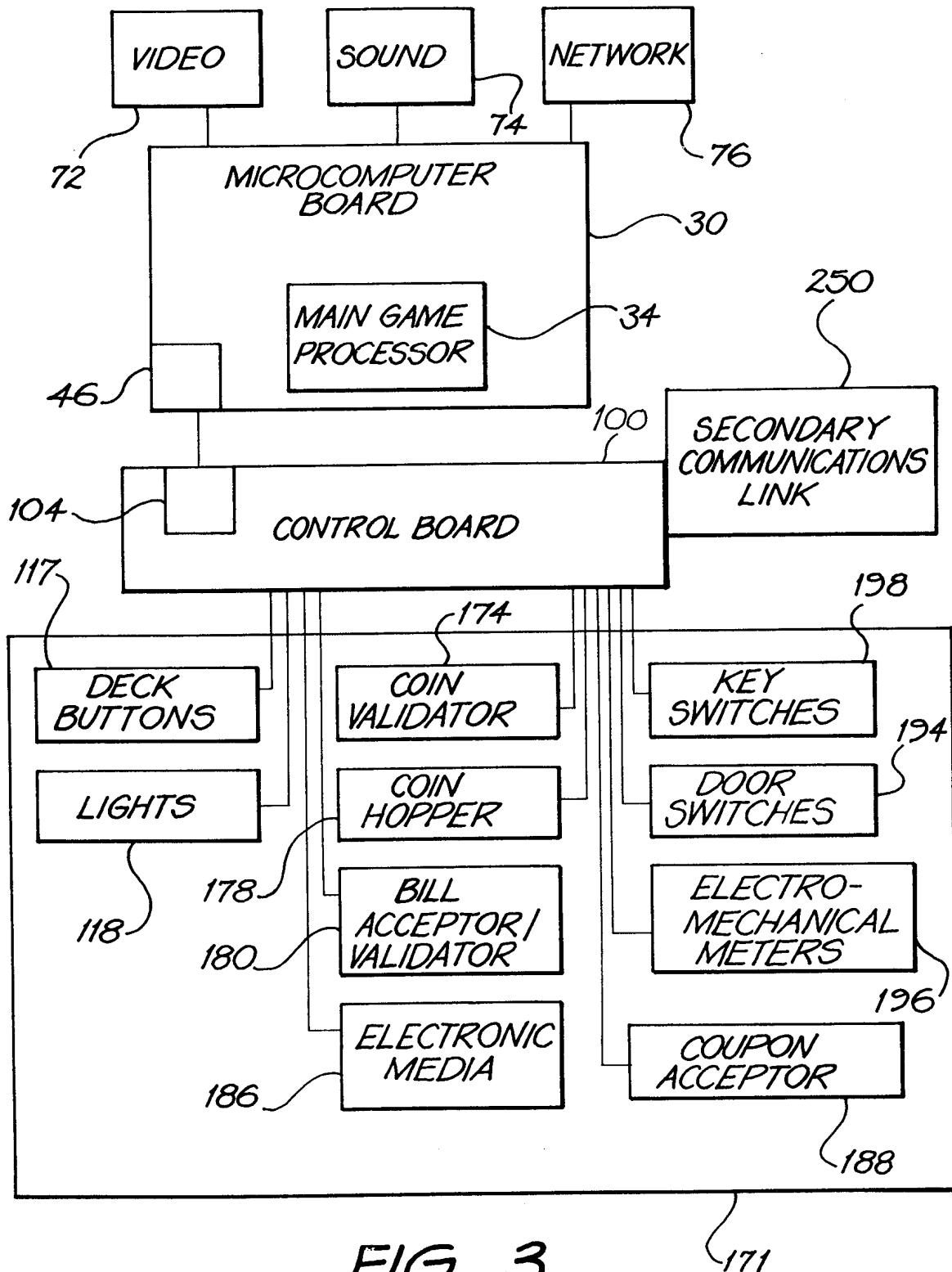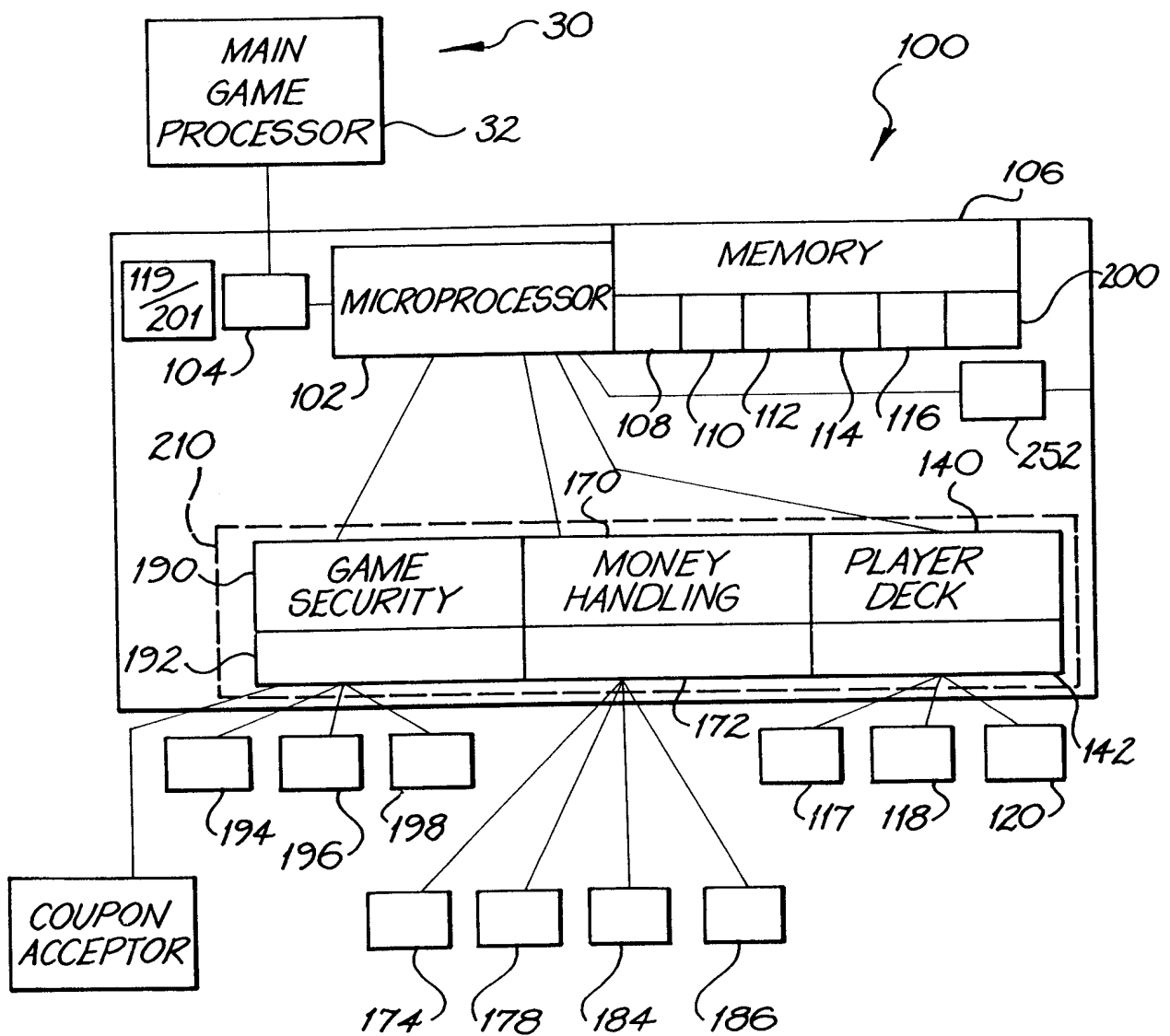
FIG. 1
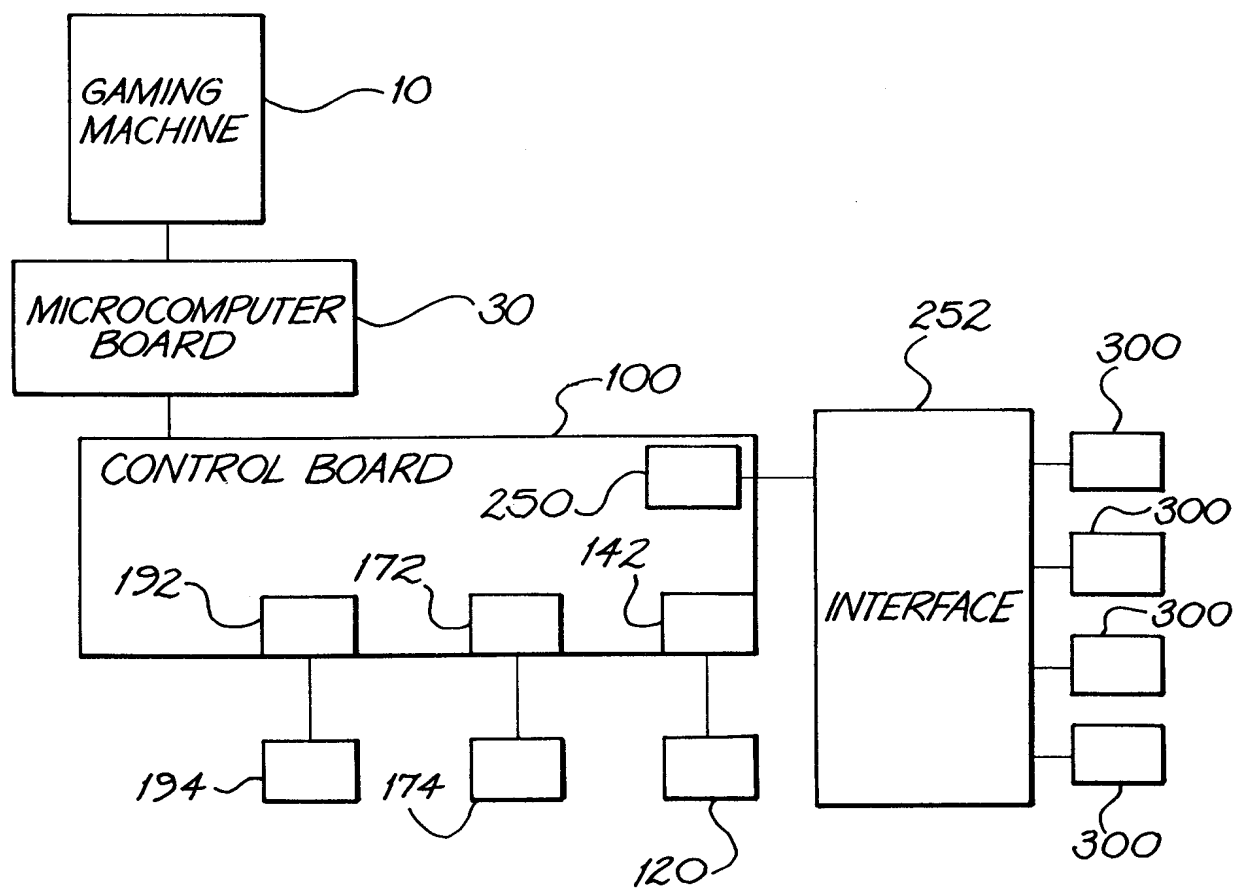
30

32

MICROPROCESSOR — 34

MEMORY — 36

VOLATILE STORAGE — 38

NON-VOLATILE STORAGE — 40

SECURED MEMORY — 42

NON-SECURED MEMORY — 44

GAME SOFTWARE — 54

GRAPHICAL USER INTERFACE — 52

46

50 — OPERATING SYSTEM

INTERFACE SOFTWARE SYSTEM — 70

71

VIDEO HARDWARE | SOUND HARDWARE | NETWORK HARDWARE

72 | 74 | 76

FIG. 2

VIDEO

SOUND

NETWORK

72

74

76

MICROCOMPUTER
BOARD

30

MAIN GAME
PROCESSOR

34

250

46

100

SECONDARY
COMMUNICATIONS
LINK

104

CONTROL BOARD

117

198

DECK
BUTTONS

COIN
VALIDATOR

174

KEY
SWITCHES

LIGHTS

COIN
HOPPER

DOOR
SWITCHES

194

118

178

BILL
ACCEPTOR /
VALIDATOR

180

ELECTRO-
MECHANICAL
METERS

196

ELECTRONIC
MEDIA

COUPON
ACCEPTOR

186

188

171

FIG. 3

FIG. 4

FIG. 5

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl⁶: G06F 17/60, 161:00; A63F 9/22, 9/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC G06F 17/00, 161:00; A63F 9/22, 9/24

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPAT: POKER (W)MACHINE# OR DISH (W) ROULETTE OR FRUIT (W) MACHINE# OR GAMING (W)
        MACHINE# OR GAMBLING (W) MACHINE# OR SLOT (W) MACHINE# OR BLACK JACK (W)
        MACHINE#

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97/12315 A (WINTECH INVESTMENTS PTY. LTD) 3 April 1997 Entire document	1-7, 9, 10, 13-29, 31, 32, 36-42
Y	Entire document	8, 11-13, 30, 33-35
Y	JP 9-106471 A (UNIVERSAL HANBAI KK) 22 April 1997 Abstract, Figure	8, 11-13, 30, 33-35
Y	JP 59-057397 A (OGASAWARA NAMIHIKO) 2 April 1984 Title	8, 11-13, 30, 33-35

| X | Further documents are listed in the continuation of Box C | | X | See patent family annex |

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	Document defining the general state of the art which is not considered to be of particular relevance		
"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search 8 June 1999	Date of mailing of the international search report **2 2 JUN 1999**
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No.: (02) 6285 3929	Authorized officer **C. BERKO** Telephone No.: (02) 6283 2169

INTERNATIONAL SEARCH REPORT

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y	Entire document	8, 11-13, 30 33, 35
	WO 96/12262 A (ACRES GAMING INC.,) 25 April 1996	
X	Entire document; (in particular Abstract, pages 1-2, 11-16, 34-37 and figures 1-13)	1-7, 14-22
Y	Entire document.	8-13, 23-42
	WO 97/13220 A (PHILIPS ELECTRONICS N.V.) 10 April 1997	
X	Entire document	1-6
Y	Entire document	23-28
	US 5577735 A (REED et al.) 26 November 1996	
X	Entire document	1-6
Y	Entire document	23-28

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
WO	9712315	AU	69807/96	CA	2232964	GB	2320664
WO	9712338	AU	69806/96	CA	2233039	GB	2323303
WO	9612262	AU	27192/95	AU	35878/95	AU	48478/97
		AU	74161/98	US	5655961	US	5702304
		US	5741183	US	5752882	US	5820459
		US	5836817				
WO	9713220	EP	800689				
US	5577735	US	5251909				

END OF ANNEX